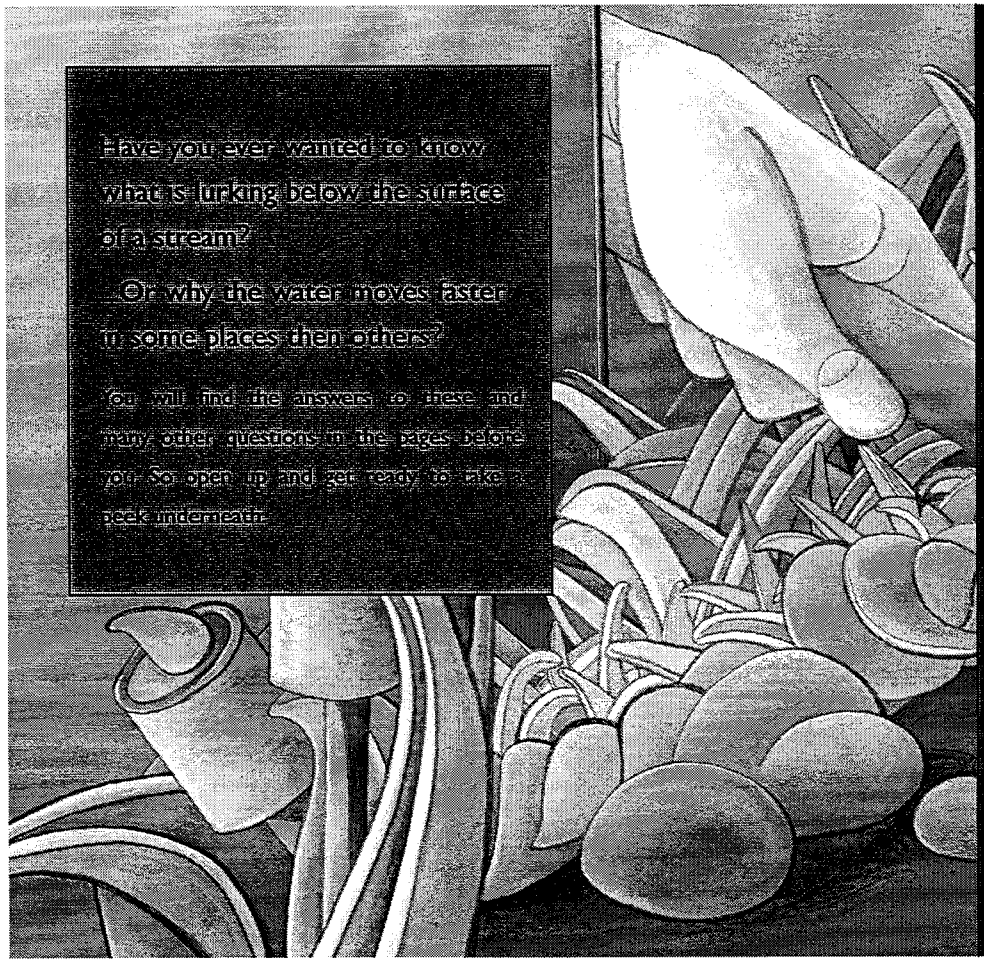
2012

Take a Peek underneath life in stream

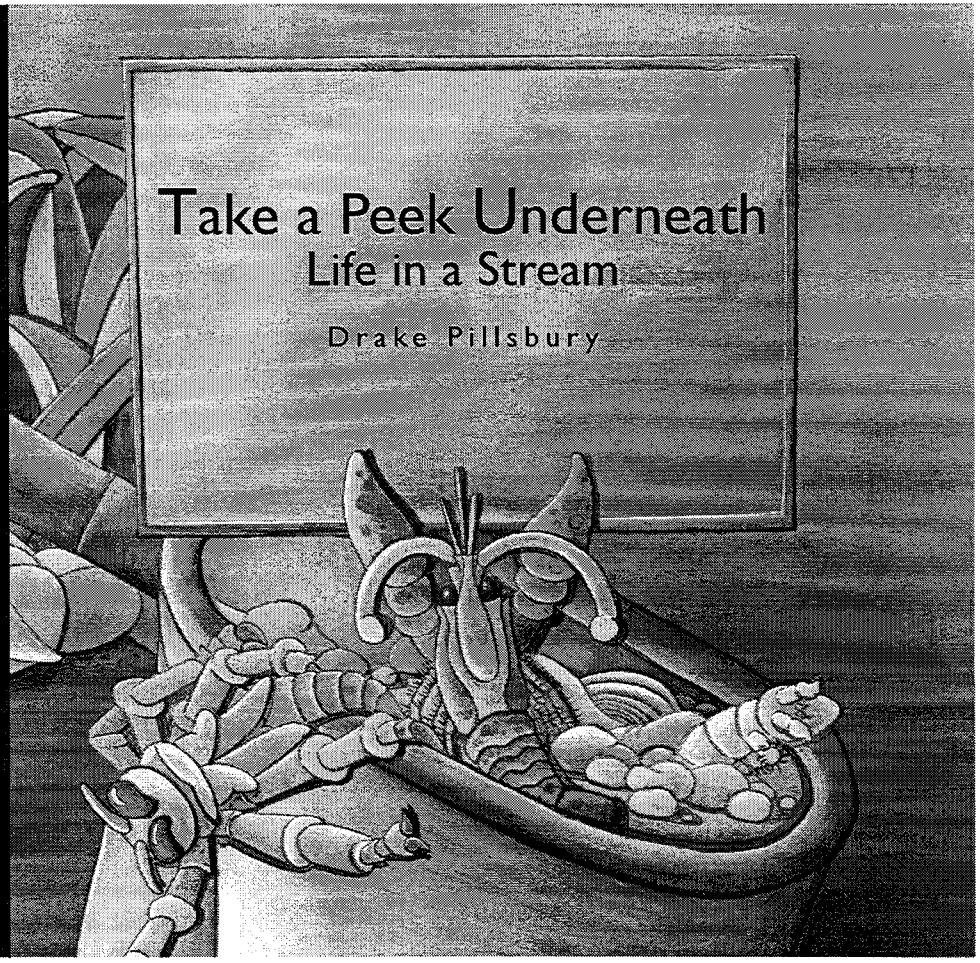
Drake Elizabeth Pillsbury



Have you ever wanted to know what's lurking below the surface of a stream?

Or why the water moves faster in some places then others?

You will find the answers to these and many other questions in the pages before you. So open up and get ready to take a peek underneath.



Take a Peek Underneath

Life in a Stream

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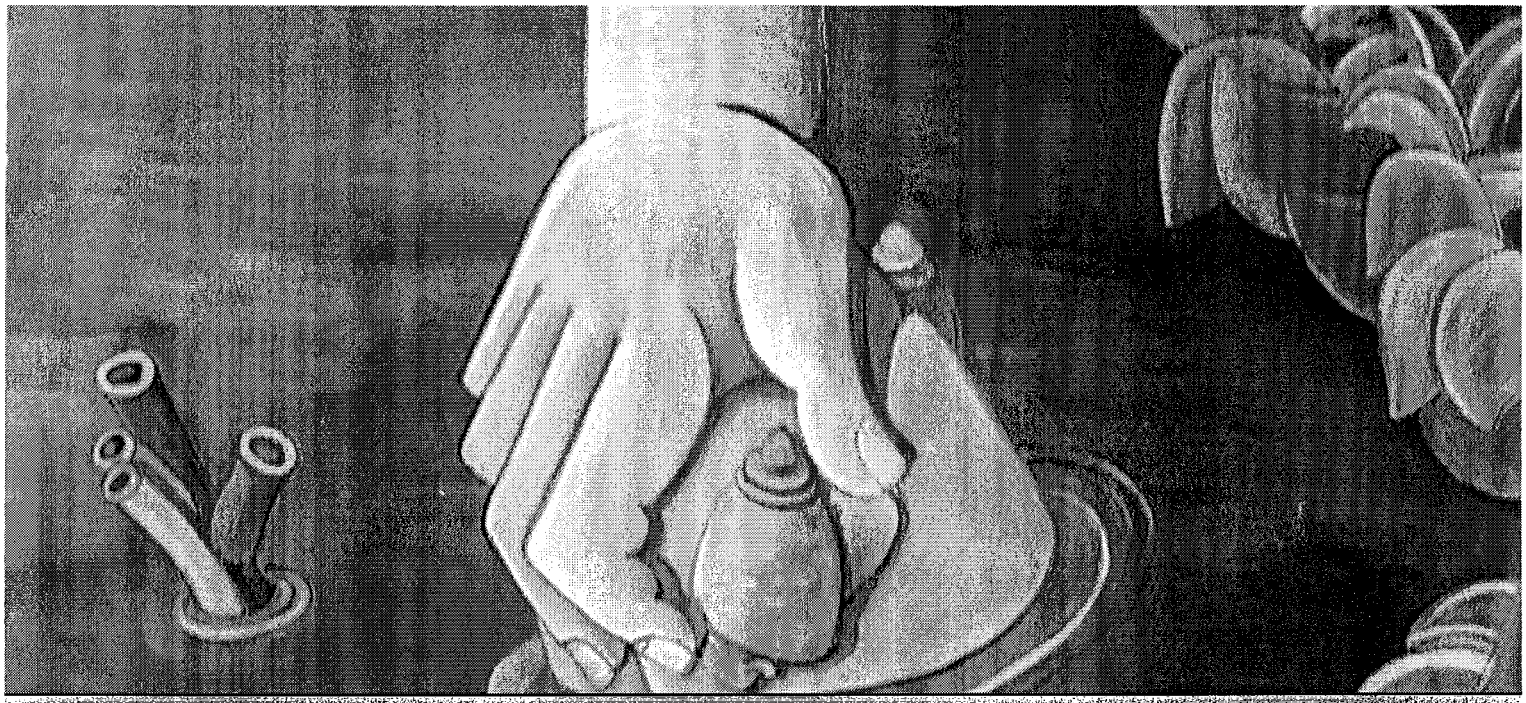
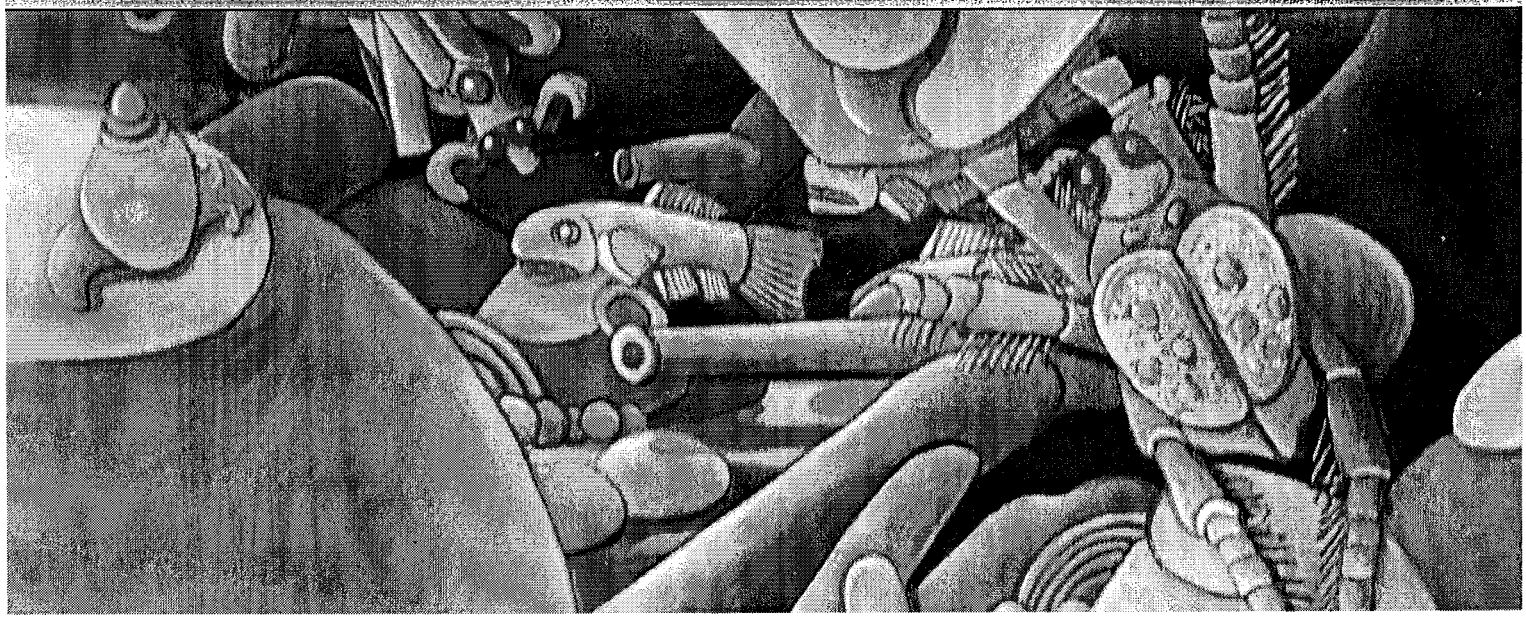


Take a Peek Underneath

Life in a Stream

Written and Illustrated by Drake Pillsbury



To my dad, whose creek walks inspired a
young biologist, and to my son, whose
daily wonderment at the world
keeps me motivated.

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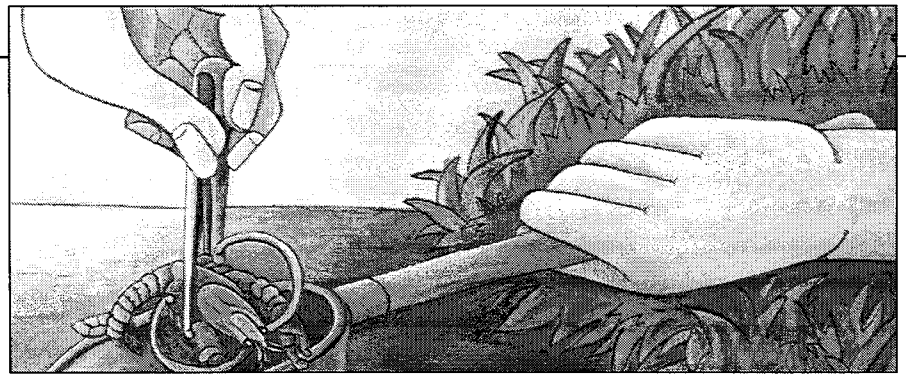
Getting Started

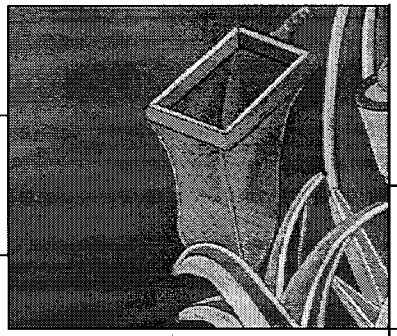
Here is what you need to know to get out and explore your nearby stream. This is what you will need and where to look to find stream creatures.



How to Collect in a Stream?

The best places to find animals is under rocks, along the stream bottom and along the stream bank. The best way to start looking for animals is to lift up rocks and sticks and see what you can find crawling around. If it is fall you can grab a handful of leaves floating on the surface and sort through them. If you have a net you can use it to scoop along the bottom of the stream or along the bank. You can use a net in other ways as well. One way is to place the net in an area of current with the open end facing your foot, push your foot around on the bottom and gently move the sand and rocks into the net. In this way you stir up the animals living in the muck and the current takes them into your waiting net.

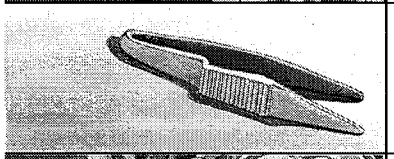
Once you have filled your net it is helpful to sift through the muck to see what you can find. Often what you will find in your net does not look like much more than a pile of muck, but hiding in that muck can be many tiny creatures. Move your sifting pan in a slow back and forth motion to allow the smaller sand and grit to pass through making it easier to see what you have found.



What Will You Need?

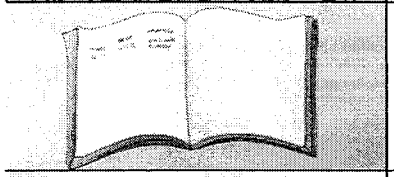
When collecting in a stream the best equipment is right before your eyes: your hands. Although your hands are your best tools, there are some pieces of equipment that will be helpful.

Net: A net comes in handy — imagine trying to capture a slippery fish with your hands! Nets are great for scooping in the bottom of a stream or along the edge of a bank. When choosing a net an aquarium or pool net works well.

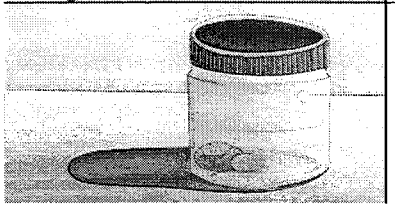


Tweezers: Tweezers are helpful when sorting through what you find. Many invertebrates can pinch or sting and tweezers will keep your fingers safe. You can buy special science tweezers known as forceps, but drugstore tweezers will work as well.

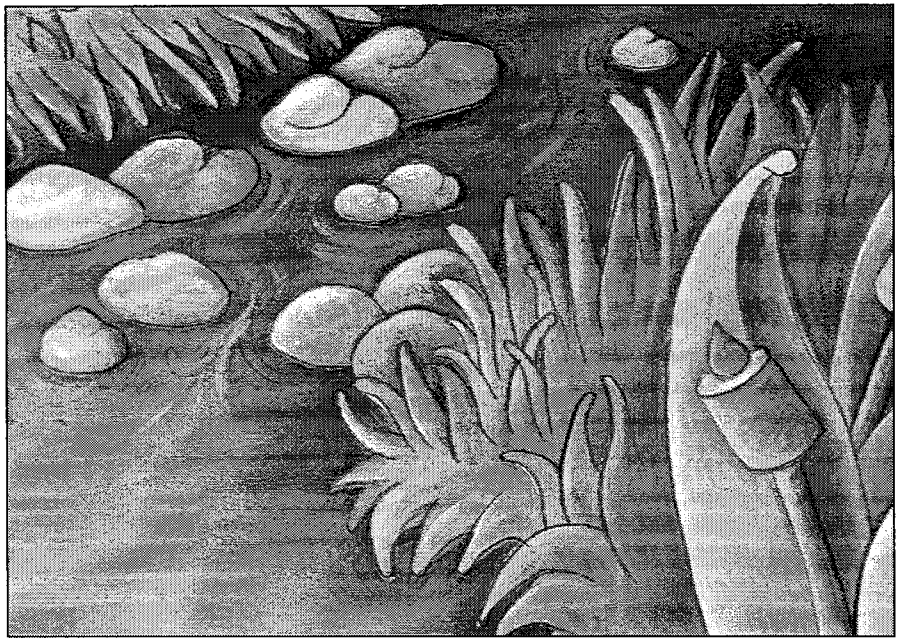
Sifting Pan: You can make a sifting pan or use a plastic sifter meant for sandbox play. To make your own sifting pan attach a square piece of mesh to a square wooden frame.



Notebook: Scientists use notebooks to keep track of their observations (things you notice about the stream or the animals you find). You can do the same. It is important to record not just what you find, but the time of day, the date, the location of the stream, and where in the stream you found creatures.



Collecting Jars: Also useful are collecting jars which can be used to bring home what you find. Old glass jars work the best — just remember to clean them out first.



Where to Look?

At first glance you may think a stream looks all the same, but this is not true. Streams are made up of different areas or zones. In each of these zones different animals can be found. The two zones of a stream are riffles and pools. The riffles are the fast moving parts of the stream and the pools are the slow sections in between. Other than the two main zones of the stream it is important to also check along the stream banks. Many creatures find refuge in the roots and sticks along the edge of the stream.

What is a Pool?

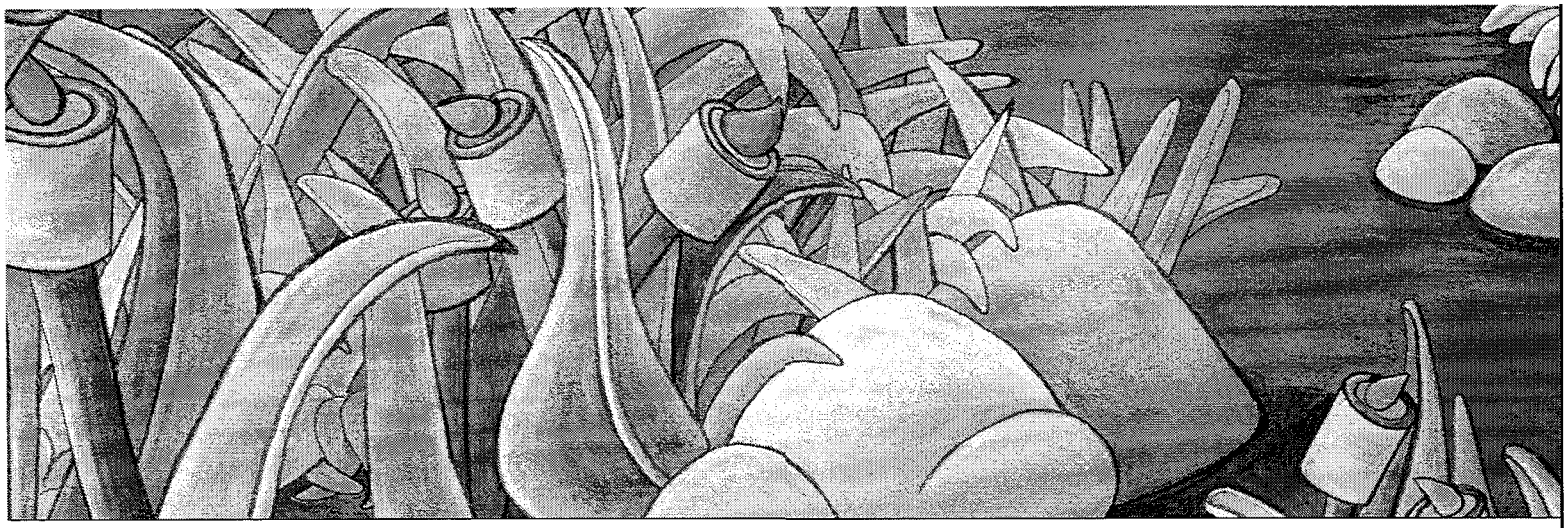
A pool is the slow moving part of the stream between the riffles. Like the name implies the water here is slow and pool-like. As the water backs up behind the rocks of the riffle the pool is formed. Many of the species found in pools also live in lakes. Pools can be good places to catch fish. Many invertebrates can be found swimming in the pools, or hiding in the banks along the edge.

Water is not the only thing to "pool" up behind the rocks. A lot of the fine sediment that travels in a stream is also caught in the pools. For this reason the stream bottom of a pool is usually deep and very sandy. This sandy bottom is a good hiding place for many of the animals that live their lives burrowed down. Another draw to the pools of the stream is the deeper water you find there. Even in times of drought (times when not much rain or snow falls) pools will often still contain standing water. This makes them a good place for fish to wait out periods of drought.

What is a Riffle?

A riffle is the fast moving part of the stream. It is where rocks have gathered backing up the water causing it to speed up This called a bottleneck effect. To picture what happens in a riffle, imagine pouring water through a funnel into a bottle. As the water passes through the neck of the bottle it gets backed up. So when it comes out of the neck it is moving faster.

Riffles are an important habitat for many animals. These animals rely on the fast-moving water to push food their way. You may think that the fast moving current would be a problem for such small animals, but there are many ways they have adapted to living in riffles. For one, the cracks among the rocks provide protection from the fast moving current. Another adaptation is body shape: flattened or streamlined bodies let the current flow right over them. Still others physically attach themselves to the rocks or stream bottom.



Summer

Summer is a time when streams are full of life. The warm water and the longer days mean more sunlight and more sunlight means more plant life. Do not be surprised if in the summer the streams and rivers look greener. This is do to higher levels of photosynthesis (the process that plants use to turn the energy from the sun into food). Plant life is not all that increases. Many animals return to streams in the summer.

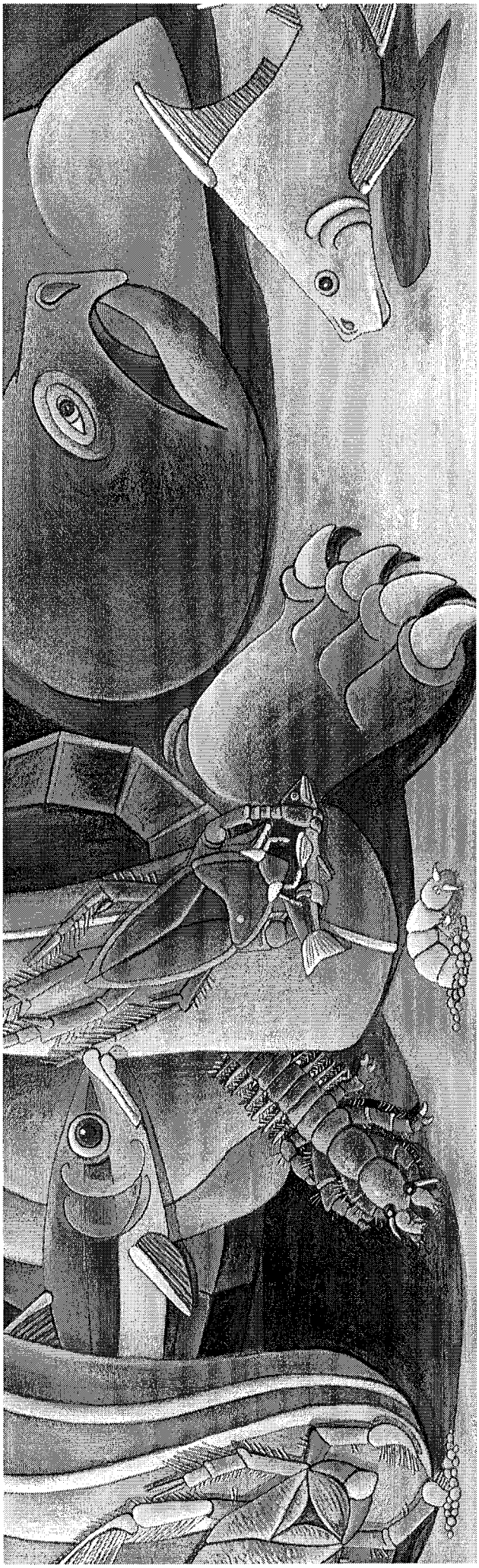
Although there are more animals in the summer, they are more likely to be found hiding out during the day due to the higher water temperatures. The best place to look for invertebrates, reptiles, and fish is along the banks of the stream and among roots and plants. When looking for reptiles you need to go out early in the morning or late in the evening when it is cooler.

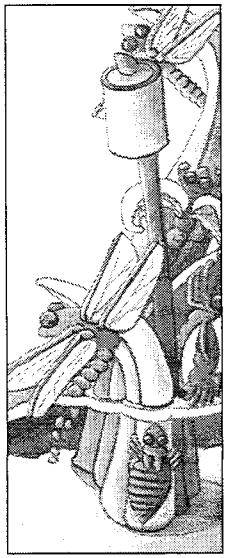
Rain: Where Does it Go?

Have you ever wondered where the water in a stream comes from? It come from many places. One way is when it rains, water runs over the land and into streams.

Not all of the water in streams comes from over the land, so where does it come from? Some comes from the ground, known as groundwater. The ground is like a giant sponge soaking up the water. So how does the water get from the ground to the streams? It leaves the ground through tiny holes in the soil of the stream banks and into the stream. This is known as inflow.

Water is leaving as well as coming into streams. Water leaves streams through evaporation This is called outflow.





The Life Cycle of an Insect

Insects start their lives much like birds: in eggs. Unlike bird eggs, insect eggs are thin and slippery. Many insects choose to lay their eggs in or around streams.

After the insects have hatched they are known as larvae. Many terrestrial (animals that do not live in the water) insects will spend the larval stage in the water. Insects such as dragonflies are only aquatic (animals that live in water) when they are larval.

Once the insect has passed the larval stage they become adults. It is at this point that insects like dragonflies will leave their watery home for good. Other insects, such as riffle beetles, will remain aquatic. This process that insects go through is called metamorphasis.

Summer Creatures

Look beyond the still waters of the summer stream and you may find some of these creatures lurking below. The deeper you look the more you find.

Water Scavenger Beetle

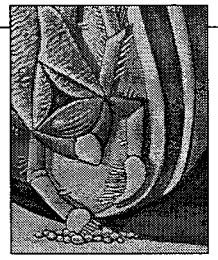
(Hydrophilidae)

Pools are where you will find these beetles, as they prefer slow moving water. The adults are swimmers while the larvae are crawlers. Both the adults and larvae are predator-engulfers. They are called scavenger beetles because they will often feed on dead animals.

Alderfly Larva

(Sialidae)

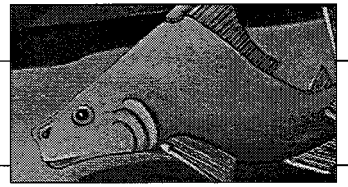
These flies are bottom dwellers. You can find them in the muck and sand at the bottom of streams. They hide out among the roots and leaves waiting for their prey. If you are having trouble finding an alderfly try digging below the surface. They are known to bury themselves in the sand.



Water Boatman

(Corixidae)

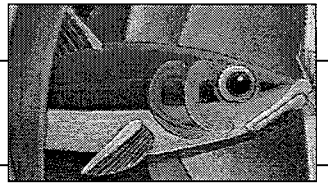
Have you even seen an insect use a spoon? Well, water boatmen use their short scoop-shaped front legs like big spoons. They stick their heads down in the sand and then scoop through it with their legs eating the plant bits that are stirred up. You will see them swimming along the stream bottom.



Carpsucker

(Carpiodes)

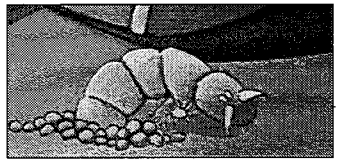
Carpsuckers can be hard to since they live on the stream bottom especially in deep pools. Their live on the stream floor since they are bottom feeders. This means they feed off bits of food that fall to the bottom of the stream.



Shiner

(Cyprinella)

Shiners are not considered to be tolerant of bad water conditions so you will not find them in polluted streams. They like big open pools with sandy bottoms. You will find shiners where insects are plentiful since this is its primary food source.



Midge

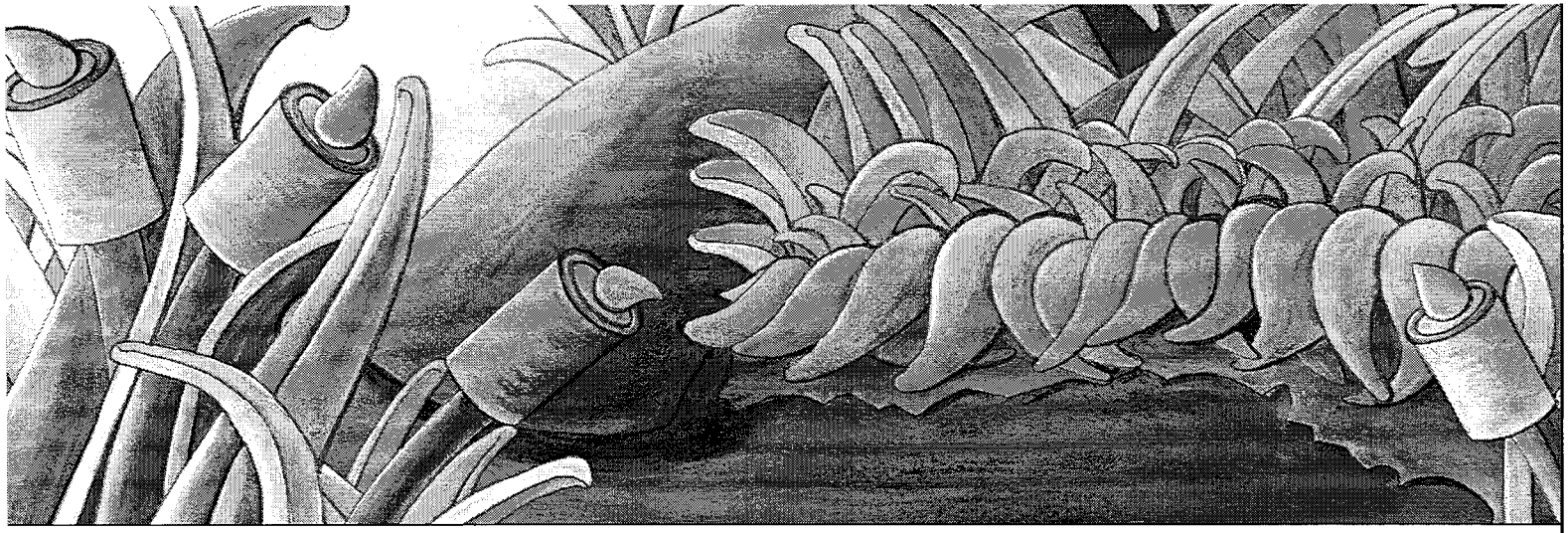
(Chironomidae)

Midges can usually be found in the fine sandy areas of streams. They live in tubes built out of sediment. Not only do they live in the sand, it is often what they eat as well. To find midges, it is best to dig into the sandy areas of the stream.

Snapping Turtle

(Chelydridae)

You do not want to mess with this turtle since they are quite aggressive. Their fierceness along with their strong sharp jaws make them a deadly predator. They have even been known to take down a swimming bird or mammal.



Fall

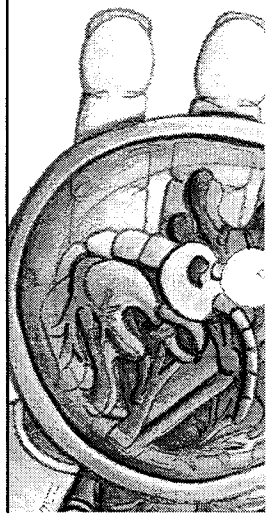
Fall is an important time for stream life: it is the time when leaf packs are present in streams. Leaf packs are clumps of leaves which can be found throughout streams in the fall. They are full of life. Shredders, (animals that break down leaves into smaller pieces) in particular, can be found in leaf packs. The food (or energy) found in leaf packs is passed along as shredders break them down. Leaf packs also provide hiding places for many invertebrates. So pick up one of those big wads of leaves and see what you can find.

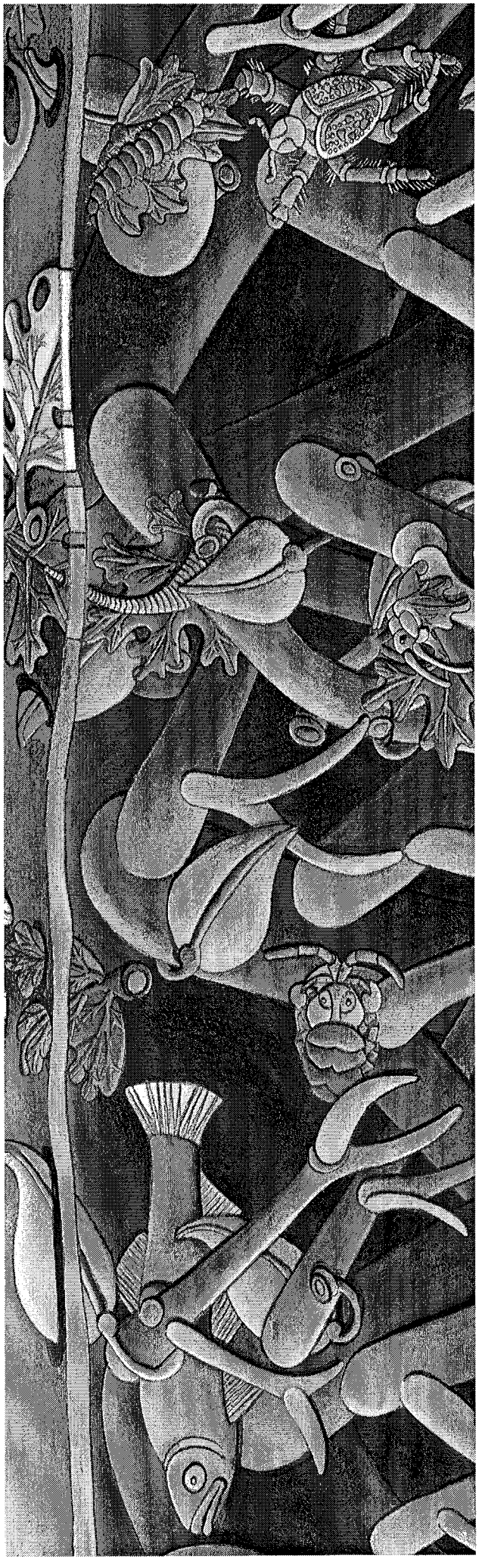
Leaf packs are not the only hiding places in a stream. The roots along the bank also provide good hiding places for many fish and invertebrates. It is cooler among the roots so they can get away from the heat of the day. Roots provide spots for invertebrates to hide from predators or to stalk their prey. Look closer in those logs and roots and see what is lurking below.

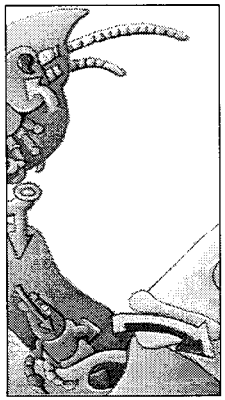
Leaf Packs and the Role of Shredders

One of the most important parts of the fall stream is the prescence of leaf packs. Leaf packs are important since they bring new food energy into the stream. Energy from the surrounding trees enter the stream through the falling leaves.

In order for this energy to enter the stream system the leaves need to be broken down. This is where shedders come in. Shredders are very important in the breaking down of material such as leaves and twigs. Amphipods are shredders. As they chew on the leaves the little bits and pieces float down to become food for other animals. So, when you pick up a leaf pack look to see what is inside it.







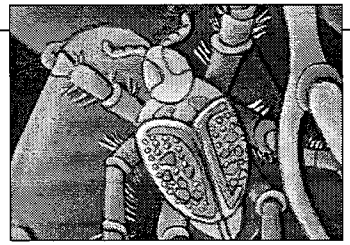
Nutrient Cycling and the Role of Leaf Packs

Leaf packs are important since they can be broken down to smaller pieces, which provide food for many more animals. This transition is important in the cycling of energy, or nutrient cycling. Nutrient cycling is when energy from one food source, such as a leaf pack, is transferred to another source, such as an animal that eats the leaf pack.

Energy is what you get from food. In natural environments it moves through different organisms and this is how they gain the energy to move, eat, and reproduce. This energy is what helps them survive. It is like their fuel.

Fall Creatures

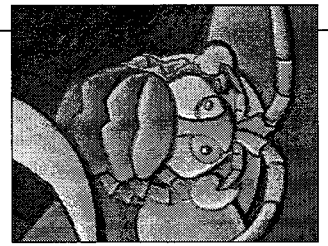
While searching through the leaves and twigs of the fall stream you may come across some of these animals. They are drawn to the leaves and debris found in the fall.



Crawling Water Beetle

(Haliplidae)

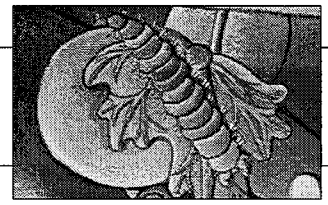
These are slow moving crawlers can be found in the pools of streams. They are so slow they have to defend themselves in other ways, like pretending to be dead when found. They are called crawling water beetles because they are awkward swimmers and prefer to move by crawling along. They are scrapers who feed primarily on algae.



Aquatic Sowbug

(Asellidae)

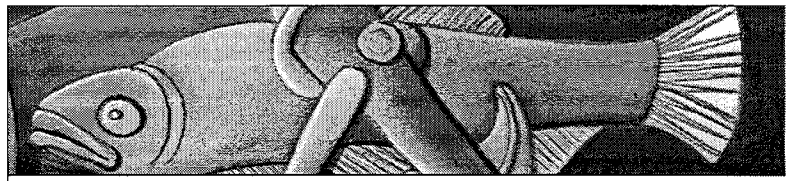
These creatures may look familiar to you. They are related to the pillbugs you find under rocks. Unlike pillbugs, they cannot roll into balls. Instead, their hard exoskeleton forms a protective barrier from predation. Sowbugs prefer to stay hidden. You can find them in shallow water hiding among rocks, sticks, and leaves. They are not picky eaters. They mostly feed on bits of food they find among the rocks and sticks on the bottom of streams, but can also be predacious.



Cranefly Larva

(Ptychopteridae, Tipulidae)

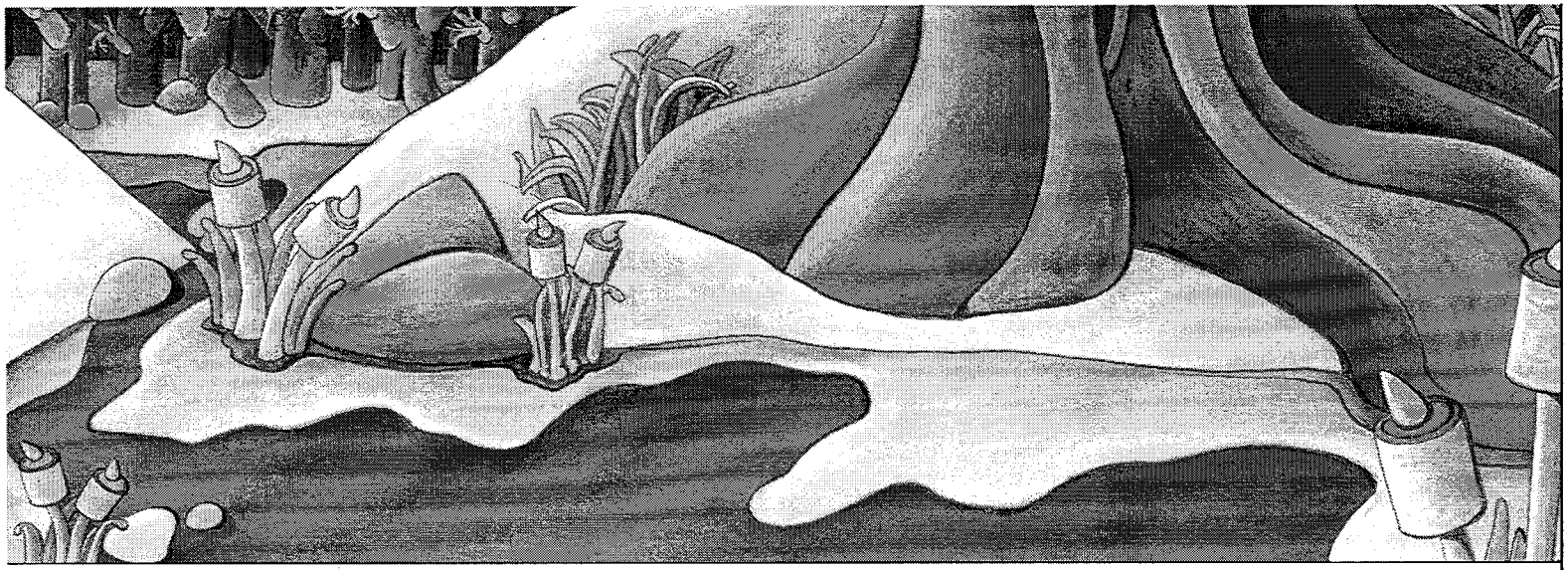
These are the most common flies found. They like to hide, so you can find them in leaf packs, branches, or algal mats. You have to pick around to find them. Craneflies are important for the breaking down of leaf packs. Like amphipods, they are shredders. Not all craneflies rely on leaf packs for food. Some are predator-engulfers. They expand their back ends so they can wedge themselves among rocks in riffles in order to wait for their prey.



Creek Chub

(Erimystax)

You will find chubs in the pools of smaller streams. The chub likes to have roots and twigs that it can hide among when it feels threatened. They are a schooling fish (form groups with others of their species). They can be very territorial and guard their area from other schools by head butting intruders.



Winter

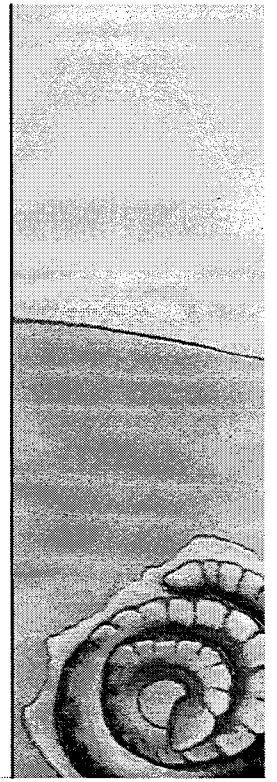
Looks can be deceiving. Just because you may see ice over the stream does not mean that there is no life underneath. Many invertebrates go about life as usual, and when the ice opens up they can be collected. Other invertebrates hibernate by burrowing down in the sand and mud. Fish can still be found in winter streams. They are not swimming around as in summer, but are hiding under roots like the stream banks.

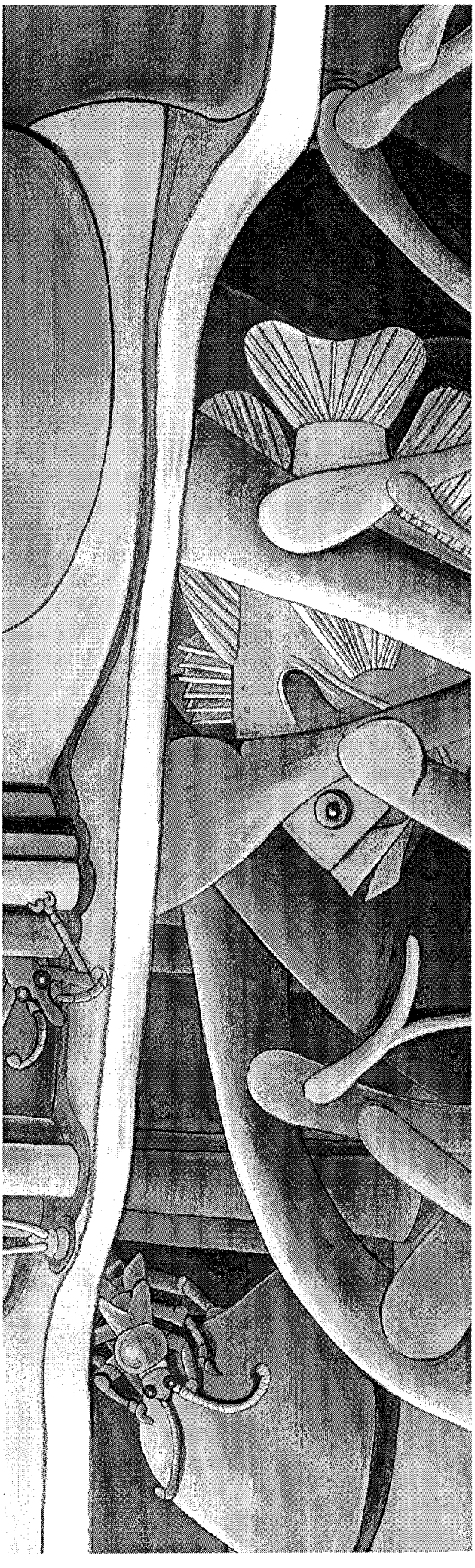
Winter is a great time to bundle up and see what you can find. Remember to be careful to stay on the bank because the ice may not hold your weight. A great place to look in the winter is where riffles are present. The fast moving water often keeps ice from forming and animals are attracted to these areas.

Insect Hibernation: Where Do They Go?

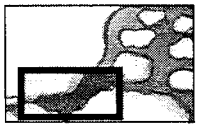
Could you imagine living in the bottom of a frozen stream? Brrrr. Some aquatic earthworms are able to hibernate during the winter. They build a case of mucus to surround their bodies. Could you imagine living in a home made of mucus? This protects them from cold temperatures in the winter and they can survive in the stream bottoms.

This is just one way aquatic insects survive the cold winter months. Some insects find hibernation inside the stream too cold. For these insects, making the trek outside the stream means survival. Creatures such as water striders find rest among the roots of nearby trees.

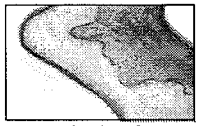




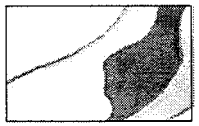
Frazil Ice



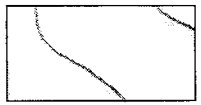
Pancake Ice



Anchor Ice



Border Ice



Sheet Ice

Ice Formation and the Problem With Current

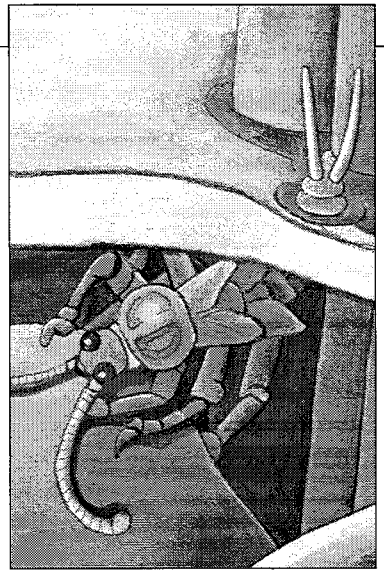
Current can be quite troublesome when it comes to winter. That fast moving water just will not freeze right. Instead it can take four different forms.

When current stops the ice from forming a sheet the ice just floats in the water, this is known as frazil ice. From frazil ice tow paths can happen. Either the ice becomes pancake or anchor ice. When frazil clusters together, pancake ice forms. When frazil ice adheres to the bottom of the stream a sheet of ice known as anchor ice is formed. Pancake ice can also clump together to form border ice which is only along the stream banks.

Ice forms first along the banks since the current is the slowest here. Watch out for border ice because it looks deceivingly safe to walk on. If the winter is longer and colder eventually ice will cover the entire stream surface, this is called sheet ice.

Winter Creatures

Take a peak under the ice and these are some of the animals you may see. Can you find these animals lurking in their winter homes?



Winter Stonefly

(Taeniopterygidae)

Winter stoneflies get their name from their unusual life cycle. Unlike most insects who move from the larval to the adult stage during the spring and summer months, winter stoneflies become adults during the winter.

These insects prefer to stay on the edges of the streams. You can find them in the sticks and rocks along the banks. In the winter, you can find winter stoneflies out of the water. They come out and run along the ice.

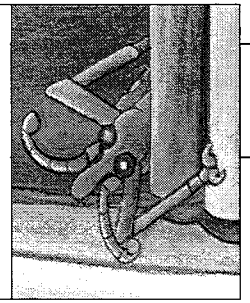
If you find winter stoneflies, you know that you have found an unpolluted stream. They are what is known as an indicator species (species that are not tolerant of pollution and can only be found in healthy streams).

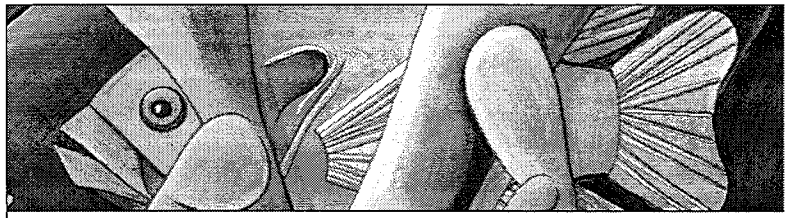
Water Striders

(Gerridae)

If you watch these insects move it looks like they are floating on the water, but they are actually skating along just like you would walk on ice. They sometimes dive below the water surface but their water repellent hairs keep them dry.

If you look harder you can find water striders in the winter as well. Water striders hibernate through the winter by leaving the stream and seek ing refuge on the stream banks. They can be found if you search among roots and sticks at the stream edge.

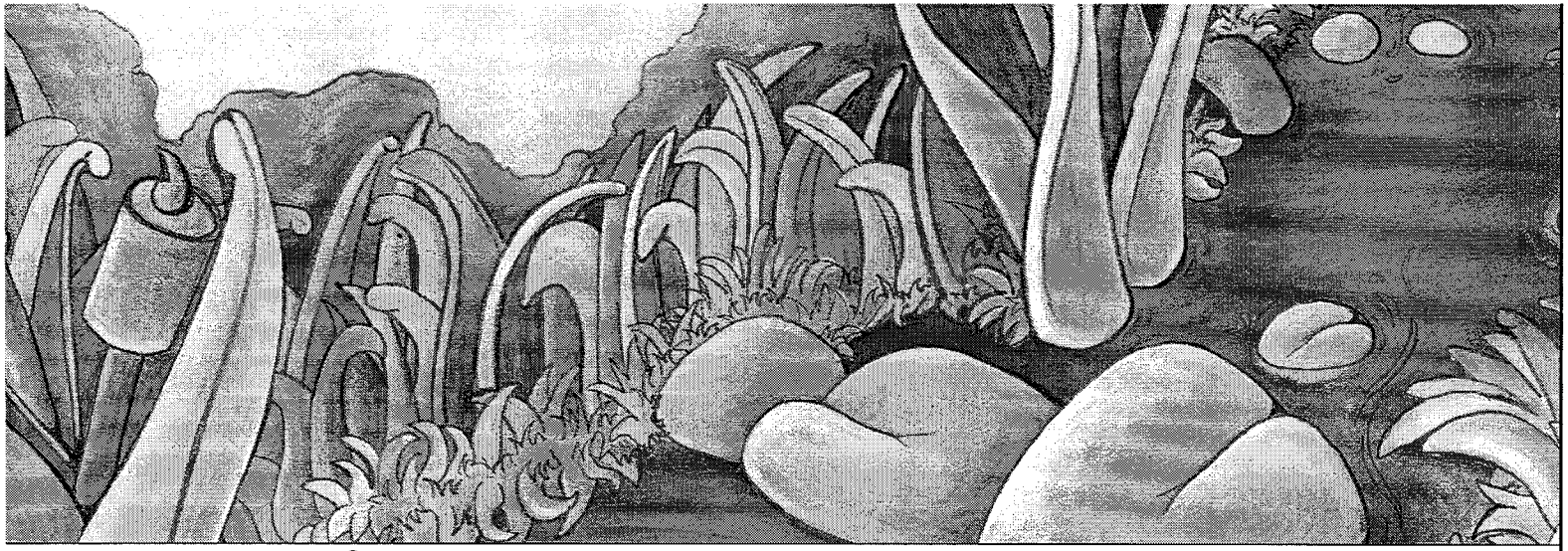




Green Sunfish

(Lepomis cyanellus)

Like the early settlers of this country this fish is known as a pioneer species (one of the first animals found in a new environment). Green sunfish prefer slow moving water and spend most of their time hiding among rocks and logs. If you see one, there may be more in hiding since they live in groups. If you want to catch a green sunfish, it is best to cast your line on the edges of the slower moving pools.



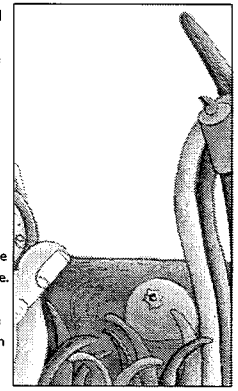
Spring

As temperatures begin to climb in the spring streams take on a new look. No longer are they covered with sheets of ice. Now you will see blocks and chunks of ice floating along or clumping into what are known as ice jams. As the ice melts in the spring, the water level rises in the stream. This causes the stream to flow faster and stronger. The spring also brings with it warmer air temperatures and longer days, both leading to warmer water temperatures.

The spring is a great time to get out and enjoy your nearby stream, but you do need to be careful and watch out for strong currents. While in winter most creatures have hunkered down for the cold months, the spring stream is full of life. Many insects that have weathered the winter as larva start to metamorphose into adults in the spring. So if you go out, pay attention to the plants at the stream's edge and you may get to see metamorphosis at work.

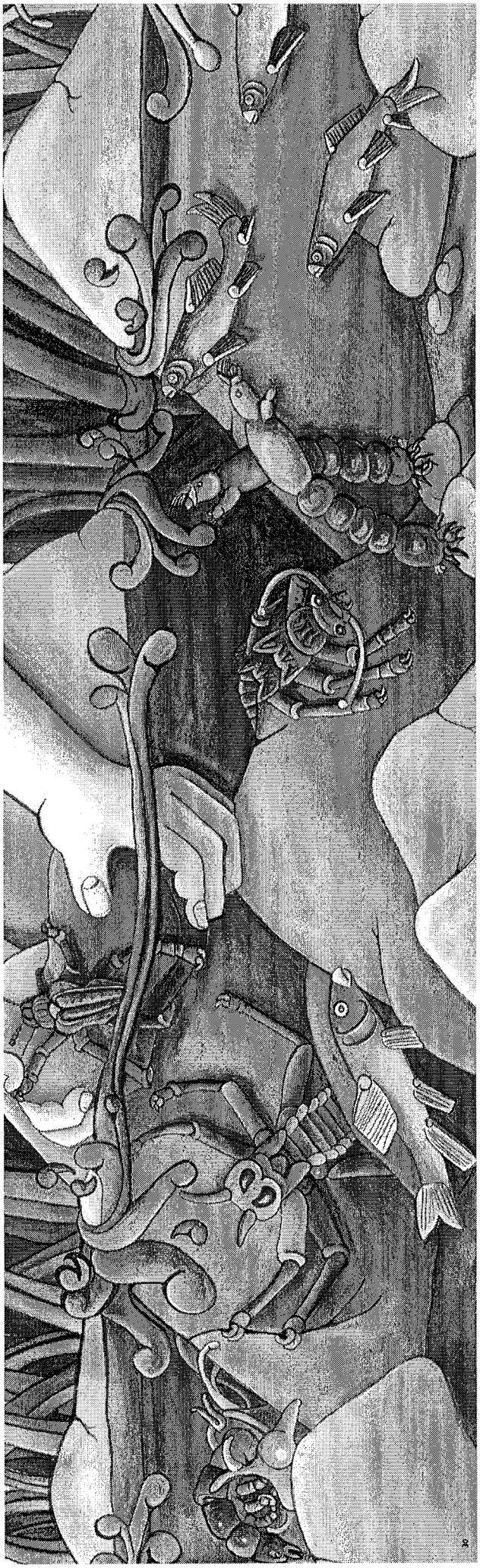
Stream Movement: Experiment Time

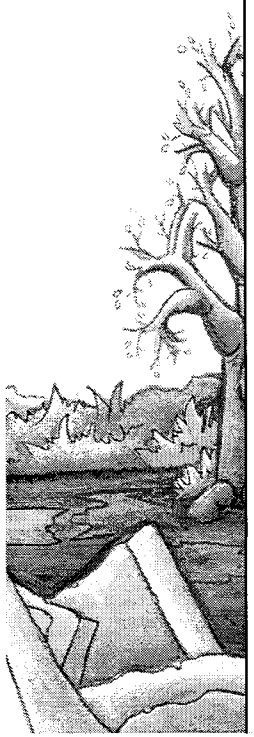
Current is the movement of the water in a stream. When you measure current you use a term called velocity. Velocity is defined as the distance an object travels in a certain period of time. Here is an experiment you can do to find out how fast a stream is moving.



This experiment takes two people. One person stands at one point in the river and the other stands downstream. It is important that the person who moves downstream measures the distance between the two people. Once both people are in place the first person drops an orange in the water. The secound person starts timing at this point and stops when the orange reaches them. Then to calculate the velocity (or current speed) simply divide the distance by the time.

Streams have different velocities at the edges and the middle, so time the orange from both banks, the middle, and then take the average of all three.





Spring Breakup: What Happens When Ice Melts

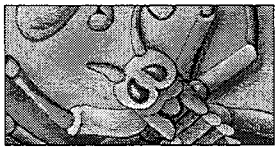
Have you noticed how, in the spring, one day you will think winter is over and you go out in your tee shirt and shorts and the next day it is back to being cold? These fluctuations (back and forth changes) have interesting effects on not just your wardrobe. They cause the ice that has covered the stream to melt in strange ways.

One effect is the formation of candle ice. It is called candle ice because the edge of the ice flows will be covered in long strands of candle shaped ice pieces. When you see this the ice is no longer safe to walk on since it is starting its melting process.

Once the candle ice starts to break up, ice flows break off and float downstream. If they meet with obstacles, the ice flows form ice jams. The ice jams act like a plug in the flow of the stream and flooding can become a problem. The spring thaw can be a very hazardous time.

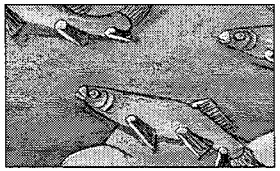
Spring Creatures

If you venture into the fast moving water of the spring stream bring your collecting jars because you may see these creatures and many others.



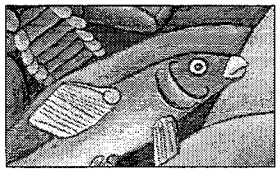
Flathead Mayfly Larva
(Heptageniidae)

Looking at the body of this mayfly, where do you think you find them? You can find them in riffles. Their flat bodies allow them to easily cling to the rocks even as the current rushes by. So look for them on the bottom of rocks.



Redhorse
(Moxostoma)

Much like some birds, these fish are migratory. Large schools of redhorses swim up stream to lay their eggs. After the eggs are hatched the parents do not stick around. Instead the fry (baby fish) form schools for protection. Redhorse are bottom dwellers and get their food from the stream bed.

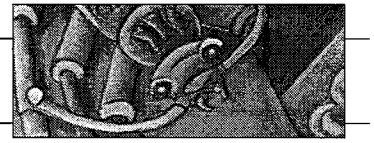


Whitesucker
(Catostomus commersoni)

You can find these fish all over. They are not picky about where they live. Suckers get their food by sucking up anything they can find on the bottom of the stream. White suckers are an old species with fossils dating back 1.8 million years.

Blackfly Larva
(Simuliidae)

You will not find blackflies moving around. They make a silk threaded pad and attach themselves to a rock. They prefer fast moving water since they are collector filterers (animals that gather their food from particles floating in the water) so the current is helpful in bringing them food.



Stonefly Larva
(Perlodidae)

If you are looking for stonefly larvae it is best to check the rocks of riffles. In the fall you can also be found in leaf packs. Although crawlers stonefly larva are quite fast moving. If you pick up a rock and find one you can watch it scurry along.

Riffle Beetle
(Elmidae)

As the name implies look in riffles for these beetles. They can be found clinging to the back of rocks. Both the larvae and the adults of riffle beetles are aquatic. They only leave the stream right after becoming adults. At this time they have been known to fly long distances. Once they reach their new home, they never fly again and live the rest of their lives in the stream.

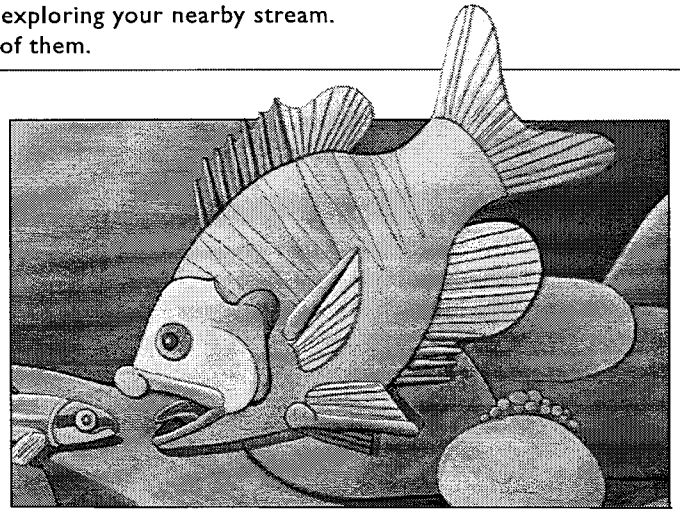
Net-spinner Caddisfly
(Hydropsychidae)

You can find these caddisflies in the cracks and crevices of rocks in riffles of streams. The net-spinning caddisfly is able to spin a fine silk-like net using only its own saliva. They are collector-filterers and use these nets to catch food particles. These special nets also provide the caddisfly with a source of shelter.

Other Creatures Lurking Below

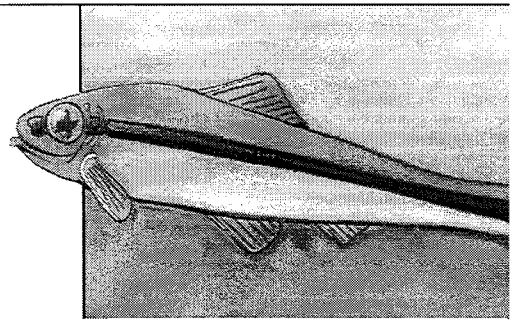
There are many other creatures you may encounter when you start exploring your nearby stream. Here are some of them.

Bluegill
(Lepomis macrochirus)

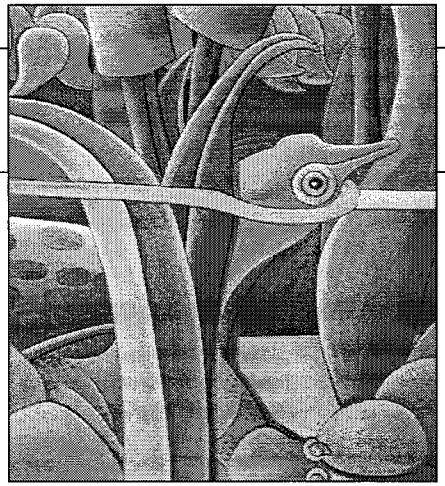


Bluegills prefer deep water with many hiding places, so look for the deeper pools of the stream to find them. You may see them at the water surface if you venture out early in the morning. The males make good fathers because they watch over the eggs until they hatch.

Minnow
(Hybognathus)

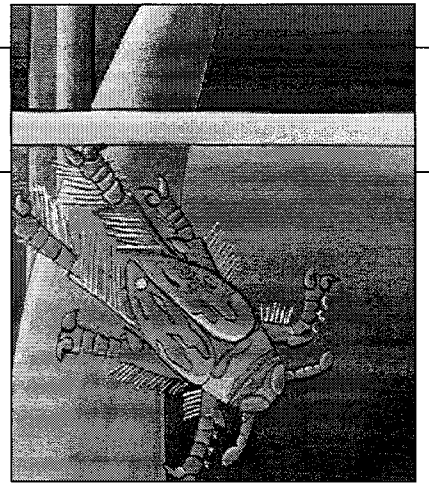


This is a common fish. The minnow can be found in small streams. If you want to find this fish you have to look into the deep pools of the stream. They are sometimes found in schools. They are a small fish and may be hard to see unless you look close. Minnows are easily caught in a net.



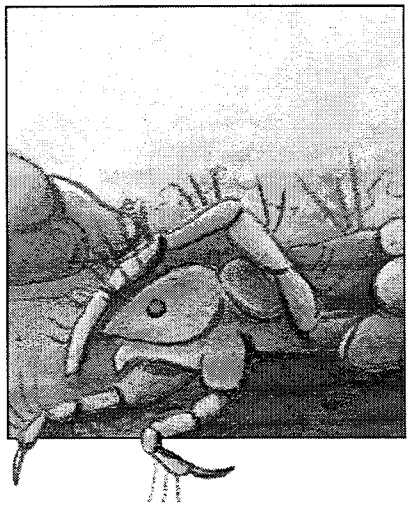
Softshell Turtle
(Trionychidae)

These sneaky turtles are colored so that they blend in. The tops of their legs are olive colored and white on the bottom. This allows them to be hidden from both above and below. Unlike other turtles who use the stream for food and cooling down but live mostly on land, softshell turtles are an aquatic species. In fact they can only swallow their food when in the water. Unlike fish, they cannot breathe under water, but rather use their long necks to reach the surface to breathe.



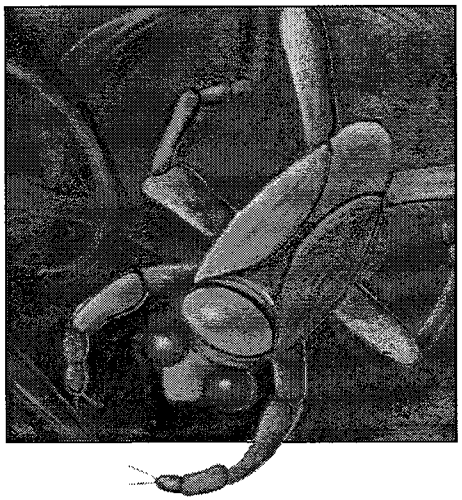
Predacious Diving Beetle
(Dytiscidae)

These fast swimmers use the hairs on the back of their legs like the oars of a boat allowing them to swim faster. You often find them with their abdomens at the waters surface and their heads down to help them breathe. As the name suggests these beetles are predatory. The adults are predator-engulfers, while the larva are predator-piercers. They are quite avid hunters and have even been known to leave the water to feed. They have very sharp mouthparts that start digesting their prey right away.



Longhorned Caddisfly
(Leptoceridae)

These caddisflies can be found in streams along the bottom or among branches. Their bodies are soft and delicate so they make a case out of small stones or plant material. They wear these cases like a turtles shell. They are mostly crawlers but they can swim for short distances.



Backswimmer
(Notonectidae)

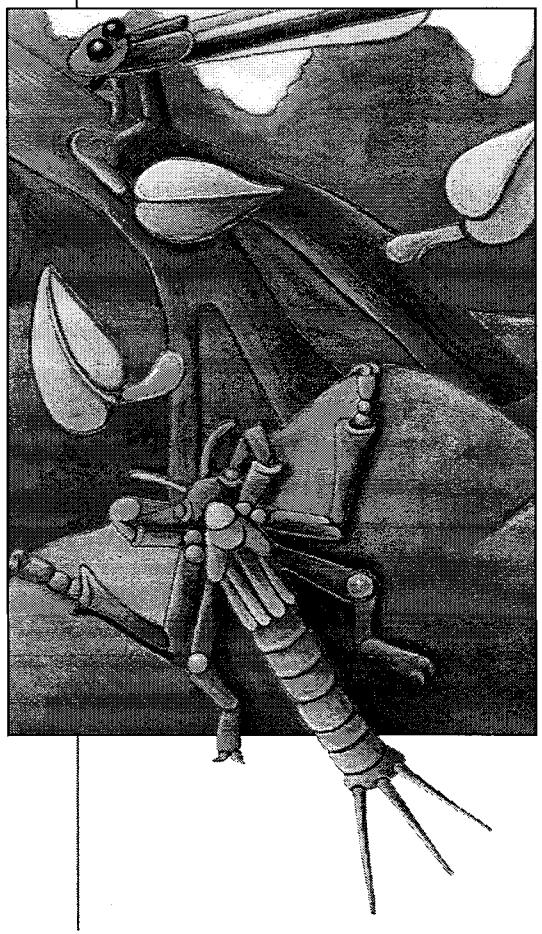
You can find backswimmers in the pools of larger streams. They spend much of their time hanging upside down at the water surface. Could you imagine hanging from your legs all day long? They are predator-piercers who will even go after small fish and tadpoles. You need to handle these insects with care because they can give you a painful sting – ouch.

Damselfly
(Odonata)

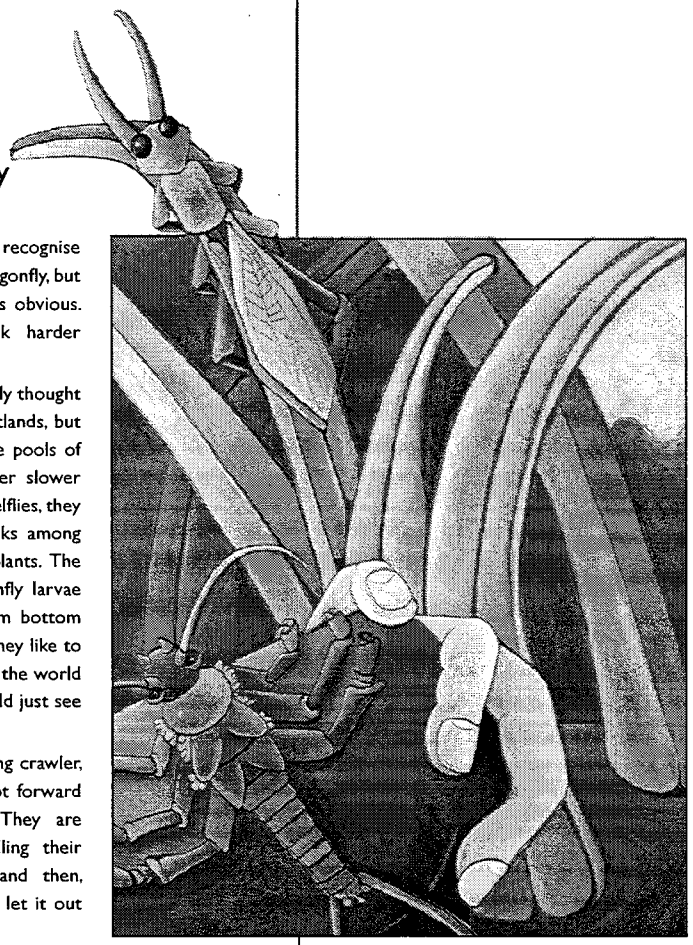
You may have seen adult damselflies buzzing around near the stream's edge. They look a lot like dragonflies but are smaller. The other way you can tell the difference from the wings. At rest damselflies wings will be together and dragonflies will be out so you see all four. As the adults buzz around above the larvae lurk in the cool waters below.

If you want to find damselfly larvae, look among the sticks and plants at the edge of the stream. A good scoop of your net in the muck will often bring damselfly larvae with it. You can tell the difference between damselfly and dragonfly larva since damselfly larva will be skinnier and longer.

Both the adult and larval stages of the damselfy are predator-engulfers feeding mostly on small insects. They can catch and eat prey bigger than you would think do to their expandable jaw.



Dragonfly
(Odonata)

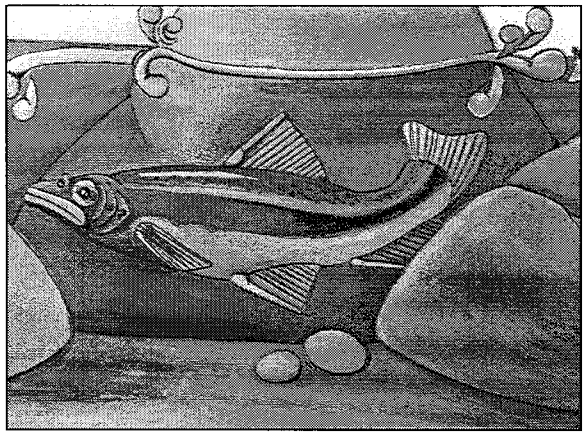


Most people can recognise the adult stage of the dragonfly, but the larval stage is not as obvious. You will have to look harder to find them.

Dragonflies are usually thought of living in ponds or wetlands, but they can be found in the pools of streams since they prefer slower moving water. Like damselflies, they stick to the stream banks among the sticks, rocks, and plants. The best way to find dragonfly larvae is to dig into the stream bottom with your net, because they like to burrow. If you could see the world as a fish sees it, you would just see their eyes peaking out.

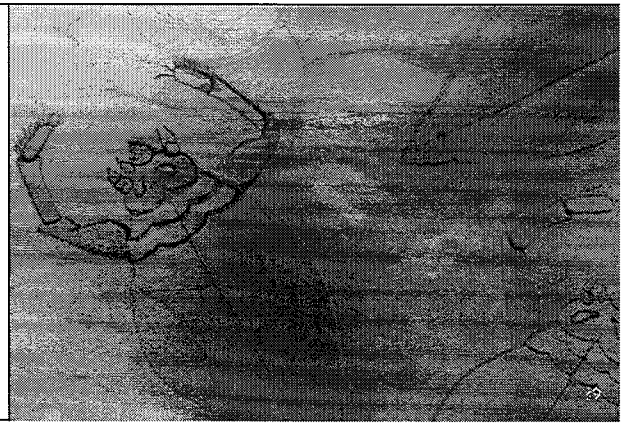
Usually a slow moving crawler, dragonfly larva can scoot forward rather fast if scared. They are able to do this by filling their abdomen with water and then, after pressure builds up, let it out to scoot forward.

Dace
(Phoxinus)



Although the dace is a common stream fish, it is not found everywhere. They prefer clear, fast-moving water. They are known to lay their eggs in gravel beds on the stream bottom. So the best place to find the dace is amongst the rocks in a riffle. If you think the dace looks familiar it could be because you have seen it in your local pet store.

Whirligig Beetle
(Gyrinidae)

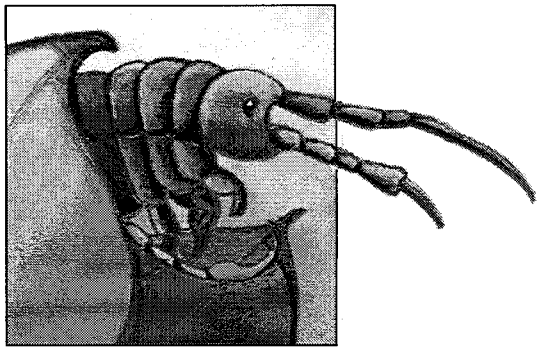


Like fish and birds these insects form groups You may see them at the water's surface swimming in schools. They get their name from the way they swim in circles. Their eyes are divided in half so they can see both below and above them. This helps them both search for food and keep an eye out for predators at the same time.

Amphipod
(Amphipoda)

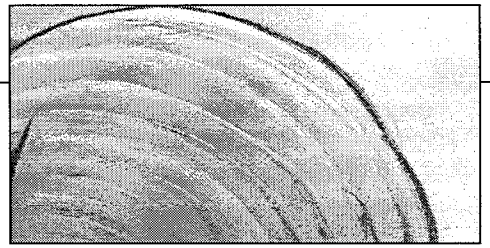
In order to see amphipods you may need a magnifying glass. When looking at the amphipod you will notice they have many legs which they use for crawling and swimming.

Unlike other aquatic insects who are most active during the day, amphipods are nocturnal (active at night). This behavior is caused by a repulsion to bright lights.



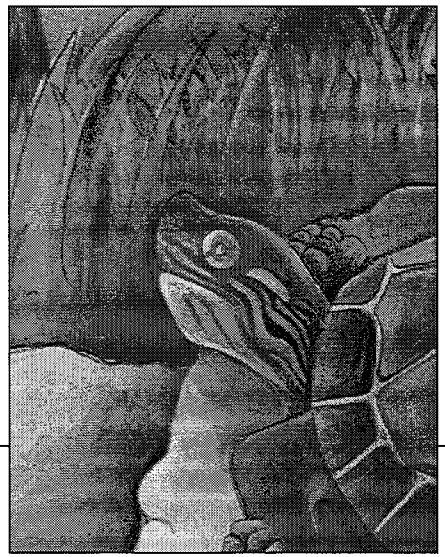
Fingernail Clam
(Sphaeriidae)

Fingernail clams are burrowers and can be found hiding deep in the sandy bottoms of streams. Burrowing can be very useful when it comes to times of drought. Fingernail clams can survive for months buried underground.



Dobsonfly
(Corydalidae)

Look among the rocks of a riffle and you might find a dobsonfly. But be careful, as they can pack a nasty bite. Those powerful jaws come in handy when attacking their prey. Like amphipods, dobsonflies are nocturnal.

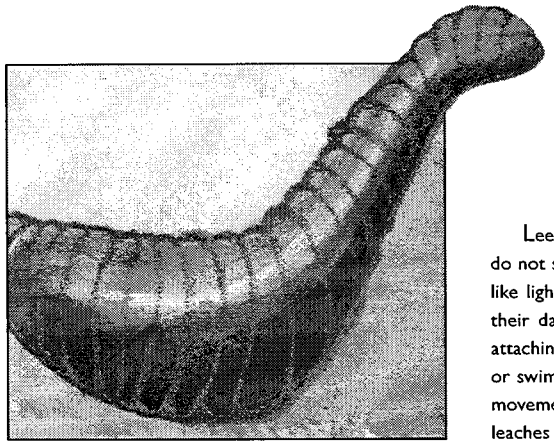


Painted Turtle
(Chrysemys)

The painted turtle will be the first turtle you see basking in the summer. Be careful, and always hold them from behind since they bite. They live off fish, insects and, as they get older, plants. Painted turtles are known to travel great distances for food and water. When traveling long distances they will move in groups. Females have even been known to travel back to a certain spot to lay their eggs.

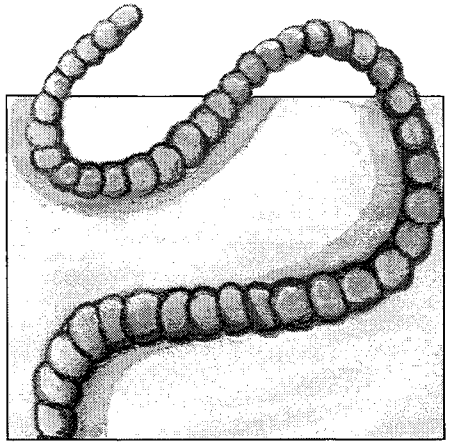
Northern Water Snake
(Nerodia sipedon sipedon)

You may see these snakes basking on logs near the water's edge or in the plants along the edge. They prefer to hide among sticks and logs then be out in the open. This is also their preferred hunting grounds. northern water snakes are different from other snakes in one interesting way. Unlike other snakes they do not lay eggs instead they are ovoviviparous (carry their eggs inside of them and give birth to baby snakes).



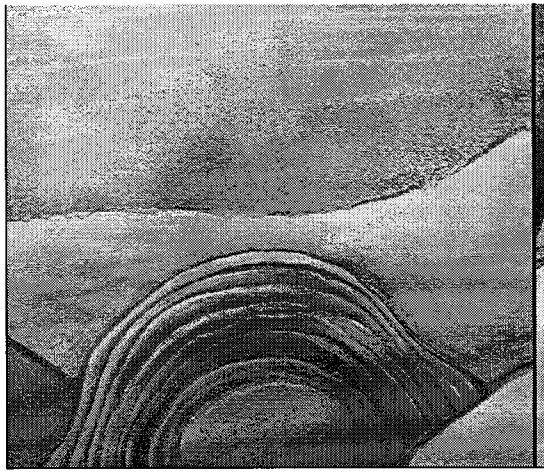
Leech
(Hirudinea)

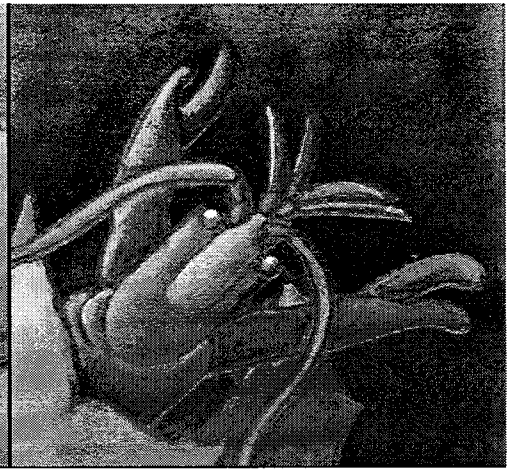
Leeches are not as bad as you may think. Most do not suck blood but are predatory. They do not like light, so they come out at night. They spend their day hiding out under rocks. They move by attaching their mouths to rocks and pushing along or swimming. Because of their need for rocks for movement and hiding places, you will not find leaches where the bottom of the stream is sandy.



Aquatic Earthworm
(Oligochaeta)

These cousins of earthworms live a similar lifestyle. They also burrow in the sediments, crawling their way through. They mostly eat the sand and mud as they crawl through it, but some are predators. Have you ever heard of a predatory earthworm? You will only find aquatic earthworms where it is sandy. If you find too many aquatic earthworms you have probably found a polluted stream since a high number of aquatic earthworms means poor water quality.





Mussel
(Unionidae)

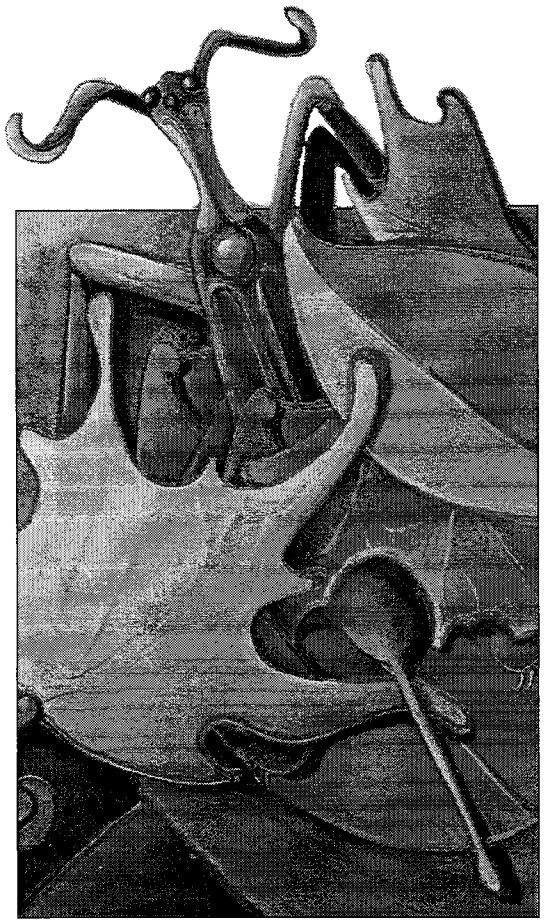
To find mussels you need to look down in the crevices of rocks since they are burrowers. Their burrowing habit is just one of the reasons these animals can be hard to find. Freshwater mussels used to be so common that people collected them. Before plastic most buttons were made from the inside of mussel shells.

Freshwater mussels are not as common as they used to be, and today most are considered endangered. This can be a problem for stream health since mussels play an important role in filtering out pollutants and improving water quality. Mussels can get quite big; sometimes as big as your fist.

Crayfish
(Astacidae)

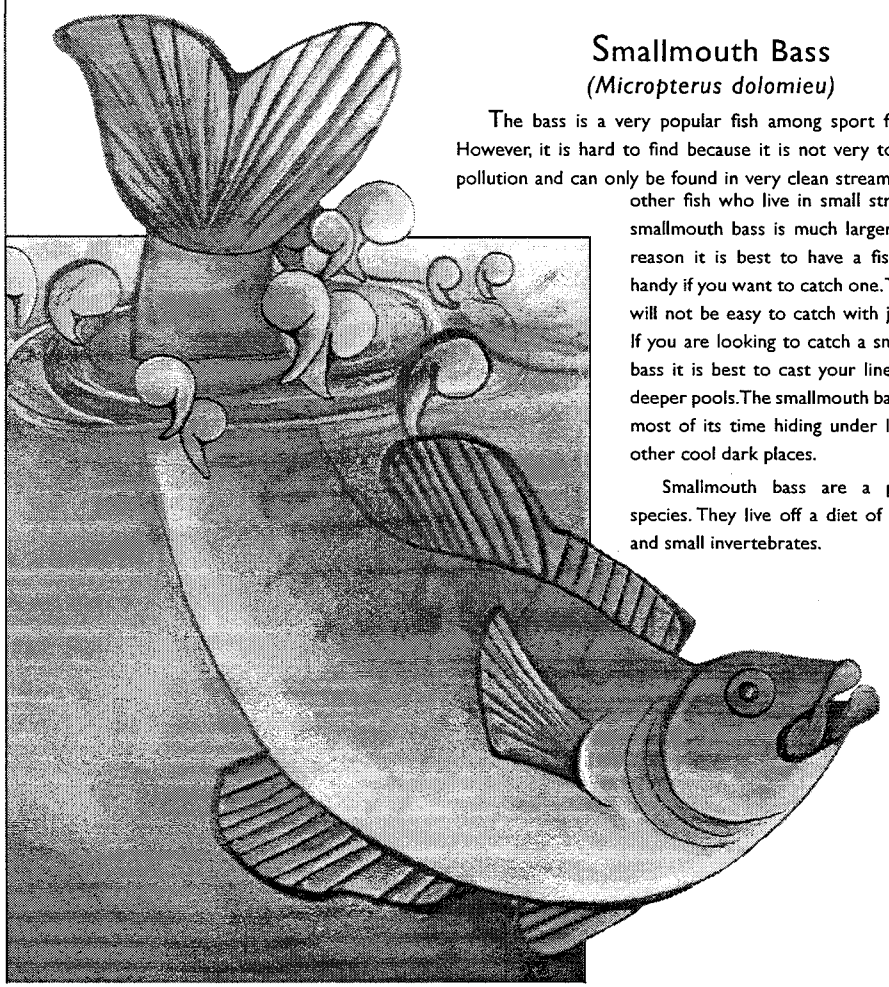
These nighttime prowlers can be found hiding among leaves and roots during the day. Some of them are burrowing and can be found buried in the mud. When they burrow they make a kind of tunnel. You can spot these tunnels by a tube of dirt left at the surface, known as chimneys. Chimneys can be found both under the water and along the stream banks.

Although crayfish spend most of their time burrowed underground, they do need to come out to eat. While they prefer to crawl along the bottom, they can swim short distances when scared. Crayfish will eat whatever they can find, although they prefer decaying plants.



Water Scorpion
(Nepidae)

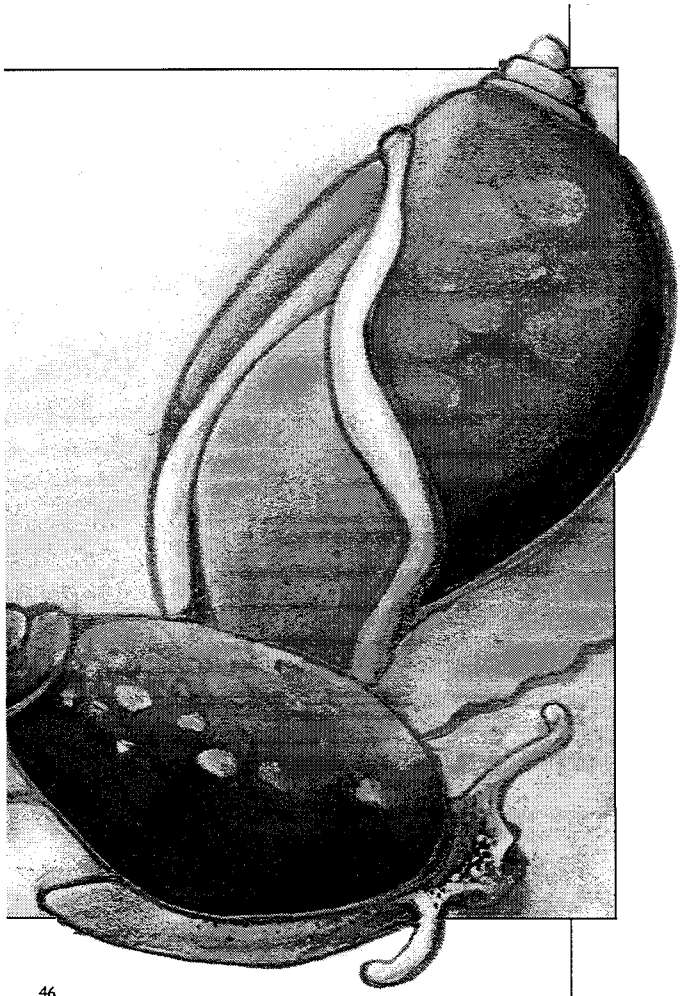
These predator-piercers can be found lurking among roots and sticks in the shallow waters of streams. They seldom move, but wait for their prey in hiding. In fact they move so little that other insects have been known to lay their eggs on them. They get their name from their front legs and the tube at the end of their abdomen. These give them a scorpion-like appearance. Unlike a scorpion, the tube is not a stinger but is used for breathing. By lifting it to the water surface they can breathe while still underwater.



Smallmouth Bass
(Micropterus dolomieu)

The bass is a very popular fish among sport fishermen. However, it is hard to find because it is not very tolerant of pollution and can only be found in very clean streams. Unlike other fish who live in small streams the smallmouth bass is much larger. For this reason it is best to have a fishing pole handy if you want to catch one. These fish will not be easy to catch with just a net. If you are looking to catch a smallmouth bass it is best to cast your line into the deeper pools. The smallmouth bass spends most of its time hiding under logs or in other cool dark places.

Smallmouth bass are a predatory species. They live off a diet of small fish and small invertebrates.



Physid Snail
(Phyidae)

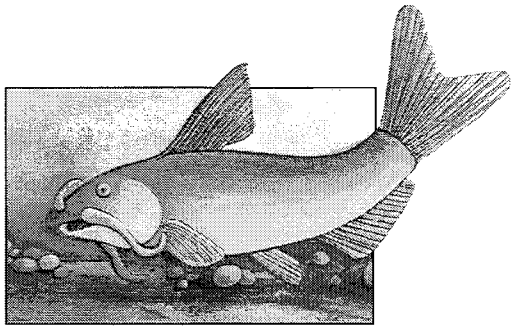
You will find these snails on the sandy bottoms of streams and clinging to rocks. Snails have a unique way of moving. The bottom of the snail is called the foot. The snail releases a mucus-like material which smooths the path for the snail to move.

The best way to find physid snails is to pick up a rock and look underneath. You will usually see them stuck to the surface. Sometimes you can even watch them moving along.

Physid snails are lung snails. This means that they use a lung-like structure to breathe. Unlike gilled snails, they need to come to the surface to breathe, so look for them hanging out at the top of the stream. Since they get their oxygen from outside the stream they are not bothered by pollution. Like aquatic earthworms, if you find mostly physid snails the stream is probably not in good health.

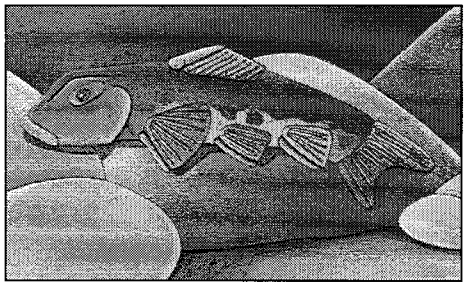
Channel Catfish
(Ictalurus punctatus)

Be careful if you catch a catfish since they are covered with spiky barbs. They get their name from the barbs on their face which look like a cat's whiskers. Their barbs serve many purposes including being covered in taste buds. These taste buds allow the catfish to find food even in murky dark water.



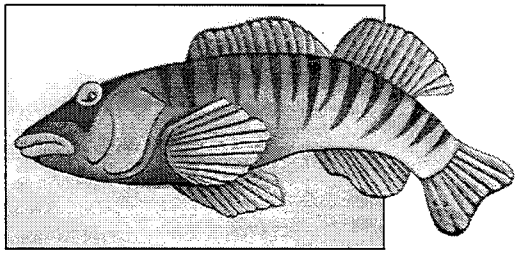
Johnny Darter
(Etheostoma nigrum)

Although the johnny darter prefers the slower moving pools, it relies on the current for food. They can be found resting on the bottom of the stream facing into the current. Rather than chasing their prey, they wait for the current to bring it to them.



Northern Hogsucker
(Hypentelium nigricans)

These fish can be found in streams with rocky bottoms. They prefer rocky bottoms since they scrape their food from the rock surface. The way they feed is useful to other fish species, such as smallmouth bass, who feed on the food that they stir up.



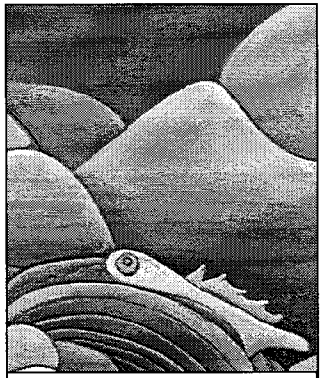
Problems Facing Streams Today

Now that you have met the animals living in and around streams it is important to know the trials they are facing.

Invasive & Threatened Species

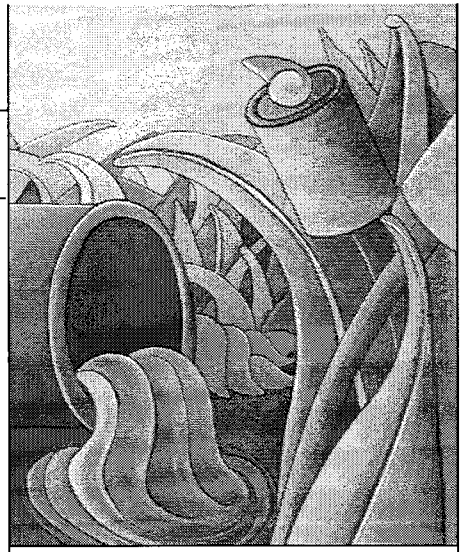
So you may be wondering what is an invasion species? Invasive species are species that are brought to a new area by man. They may be brought for food, to hunt other animals, by accident, or just because they are interesting. Because invasive species do not occur naturally, they can often cause problems in their new homes. A good example to illustrate this is the zebra mussel.

Zebra mussels came over to this country in ships. They have moved from one stream to another by attaching to the hulls of boats. Zebra mussels have quickly taken over streams since they are good at releasing their young in large numbers and reproduce fast. So why are they a problem? In order to anchor themselves they use fine threads to attach themselves to objects. Zebra mussels are not picky and they will attach themselves to mussels, often killing them. This is a problem since native mussels are already endangered. They are also problematic to humans since they will attach to the inside of pipes making it hard for water to get past and causing back-ups.

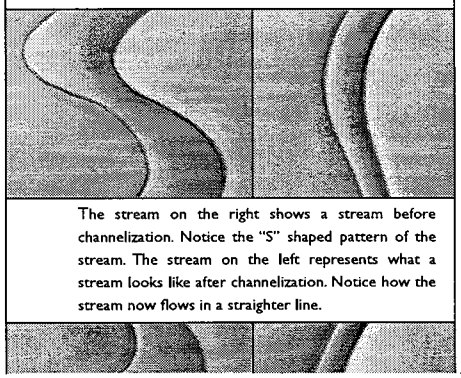


Freshwater mussel posing as a fish

One of the species most affected by zebra mussels are native mussels. At one time these mussels were plentiful, but now they are considered threatened. Zebra mussels are not the only cause of mussels declining. Their life cycle is also an issue. Mussels need fish to complete their life cycle and often certain species of mussels can only use certain species of fish. The adults release the larvae into the water and they attach onto the fishes' gills; the larvae mature inside the fish. Some mussels are very clever and have appendages that look like the fins of fish, to attract the fish. When the fish get near they spit out their larvae into the fishes gills. This dependence makes mussels more at risk.



One way run-off enters streams is through the storm drain system. All those grates along the road take the water that comes off the parking lots, sidewalks, roads and yards and channels it into our streams.



The stream on the right shows a stream before channelization. Notice the "S" shaped pattern of the stream. The stream on the left represents what a stream looks like after channelization. Notice how the stream now flows in a straighter line.

Human Impacts on Stream Health

You may have heard the word conservation used a lot on TV, at home, or at school and noticed how important it is. However thinking that conservation is important is relatively new. For generations we have treated streams (and other environments) as something to control rather than something to protect.

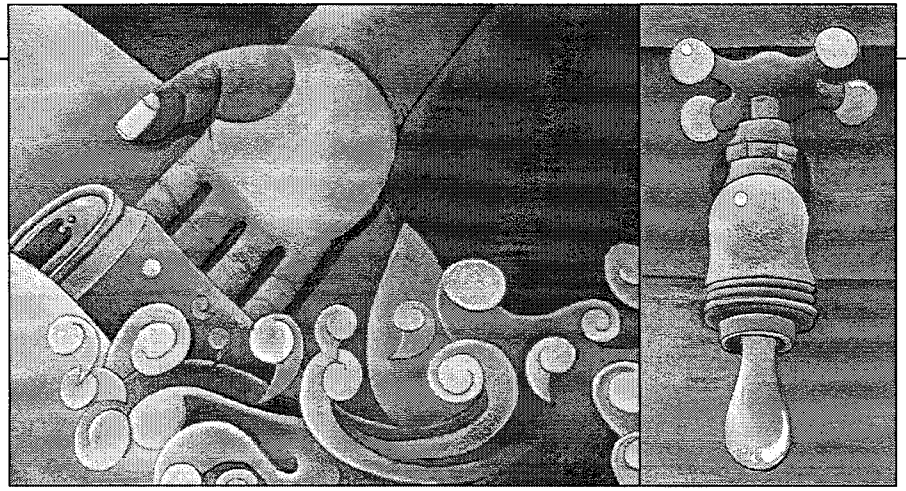
Before we knew that our actions affect stream health we did a lot of damage. Farming practices such as clearing away all vegetation (trees, bushes, and other plants) on the stream banks, draining wetlands, tiling, grazing, and stream channelization all have wreaked havoc with stream health. These practices have led to increased run-off (the water that runs over the land rather than seeping into the ground) and erosion of stream banks. This leads to more pollutants and soil getting into the stream.

You may be asking yourself, why is it bad if soil gets into the stream? Too much soil in the stream can make the water murky and harm many animals. It can also clog up the stream causing water to back up upstream. This can lead to issues with flooding.

Farming is not the only cause of reduced stream health. Urbanization has also played its role. Anytime we pave over land it has a negative impact on stream health since pavement is an impervious surface (a surface that water cannot pass through) and increases run-off. Not only does pavement increase run-off, all the pollutants on the surface of the pavement get washed into the stream increasing stream pollution.

What Can You Do?

Now that you have a better understanding of the problems facing streams you may be wondering how you can help. Here are a few small things you can do to make a difference.



Making a Difference, One Can at a Time

There are many ways you can help your nearby streams. When run-off hits a stream it brings more with it than just the pollution you cannot see. It often also carries trash and other debris into the stream. This trash can be harmful to the animals living in the stream. One small, but important, way you can help is by picking up any trash you find in and around the stream. Every time you go out simply carry a trash bag in your pocket and then you can explore and help the stream at the same time. If you want to help even more look for a local stream clean-up you can join or organise one yourself.

Changes Around the Home

Picking up trash is one way you can help when at the stream, but there are also many ways to help in your own home. The way we live our lives can have an impact on stream health.

What would a stream be without water? Just a dry bed of rocks and sand, not much to look at. Since water is so important to stream life water conservation (to use less of) is equally important. You can conserve water in many small ways. Taking shorter showers and turning off the water when you brush your teeth are just some of them.

There are other changes that can be made to help reduce stream pollution. Many of the chemicals we use both in and out of our homes end up in streams increasing the pollution levels. Choices such as what dish soap you use can make a difference, so tell your parents to buy soaps without phosphates. Also the fertilizers and herbicides we use on our lawns can harm stream life. So if you want to make a difference talk to your parents about making these changes around your home.

Important Terms

These terms will help you understand what goes on under the stream surface.

Aquatic: Plants and animals that live in water rather than on land.

Bottom-feeders: Animals that stick to the bottom of streams to find food.

Climbers: These invertebrates move by climbing. They are usually found climbing plants, but will also climb sticks and logs.

Clingers: Clingers spend their time clinging onto rocks, often in the quick-moving riffles.

Collector Filterers: Collector-filterers feed from particles floating in the water.

Collector Gatherers: This animal group gathers their food from the stream bottom and on the surface of rocks and logs. They will eat anything they can catch.

Crawlers: These invertebrates move by crawling rather than swimming.

Impervious: A ground surface, such as pavement, that water cannot pass through.

Invasive species: Invasive species are not found in environments naturally, but rather are brought to them (or introduced) by people, sometimes causing problems.

Invertebrate: These animals have no spine.

Larva: Larva are the stage in the insect life cycle after hatching.

Metamorphosis: The process insects go through to change from egg to larva to pupa to adult.

Native species: Native species were not brought by people, but evolved or came there by themselves.

Pervious: A ground surface, such as grass, that water can pass through.

Predator Engulfers: Predatory invertebrates, that swallow their prey whole.

Predator Piecers: These predators use their sharp mouth parts to pierce their prey.

Scrapers: Scrapers feed by scraping the algae off the rock surface.

Shredders: Shredders break down leaves and twigs so others can eat them.

Sprawlers: Rather than move around this invertebrate group stays sprawled in one place waiting for food to come to them.

Swimmers: Like the name says invertebrates who are swimmers move by swimming.

Terrestrial: Plants or animals that live on land.

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